

285 WHAT IS CLAIMED IS:

C L A I M S

1. Apparatus for automated stretch wrapping of articles in a stretchable transparent film, comprising:

means for holding a supply of the film;

290 film advancing means for advancing the film forwardly over an opening at a wrapping station;

film clamping means for holding the film in a generally planar web across the opening;

means for placing an article to be wrapped on the film web at the wrapping station;

means for pushing the article against the film and through the opening to stretch the film

295 and form a bag-like enclosure at least partially enveloping the article; and

film gathering, sealing and trimming means adjacent the opening for gathering excess film material extending between the opening and the article, said film gathering, sealing and trimming means operative to gather the film in two stages to fully envelope the article, including a first stage in which the film is gathered into a generally flattened condition, and a second stage
300 in which the film is further gathered into a necked down condition, and said sealing and trimming means is operative to engage the necked down film to seal it and separate the excess film from the stretch-wrapped article.

2. Apparatus as claimed in claim 1, wherein:

the film supply comprises an elongate strip of film in a supply roll supported in
305 spaced relationship to the film advancing means; and

said film advancing means includes film gripping means for gripping and holding a leading edge of the film, said film gripping means being movable in a forward direction from a retracted position rearwardly of said opening to an extended position forwardly of the opening where it releases the film, and movable in a rearward direction to its retracted position where it
310 again grips the film in preparation for advancing another section of film over the opening.

3. Apparatus as claimed in claim 2, wherein:

315 said film advancing means further comprises a film unwind roller engaged with the strip of film and movable forwardly with the film gripping means, said film unwind roller being mounted for movement in said rearward direction independently of movement of the gripper means and operative to unwind additional film from the supply roll as the unwind roller is moved in said rearward direction, said movement in said rearward direction being slower than said
320 movement in said forward direction to avoid placing undue stress on the film as it is unwound from the supply roll.

4. Apparatus as claimed in claim 3, wherein:

a dancer roller is yieldably engaged with the strip of film between the supply roll and the film unwind roller to maintain a predetermined light tension on the film as it is unwound from
325 the supply roll.

5. Apparatus as claimed in claim 3, wherein:

first actuating means is connected with said film gripping means to move it in said forward and rearward directions; and

link means is connected between said first actuating means and said film unwind roller to
330 cause said film unwind roller to move with said film gripping means in said forward direction.

6. Apparatus as claimed in claim 5, wherein:

said link means is free of connection with said first actuating means upon movement of said first actuating means in said rearward direction; and

second actuating means is connected with said film unwind roller to move it in said
335 rearward direction independently of rearward movement of said film gripper means, said rearward movement of said link means and film unwind roller being slower than rearward movement of said first actuating means and said film gripper means.

7. Apparatus as claimed in claim 2, wherein:

340 said film clamping means comprises a plurality of clamps arranged around said

opening to clamp said film at the forward, rearward and opposite sides of the opening, and include a front clamp at the forward edge of the opening, a rear clamp at the rearward edge of the opening, and side clamps at the opposite side edges of the opening to securely hold the film in place all around the opening.

345 8. Apparatus as claimed in claim 7, wherein:

actuator means is connected with said front, rear and side clamps to cause said front clamp to engage and hold said film prior to said gripper means releasing and moving to their retracted position, and to cause said side and rear clamps to engage and hold said film after said gripper means has moved rearwardly away from said opening.

350 9. Apparatus as claimed in claim 8, wherein:

center side clamps are positioned at the sides of said opening generally centrally located with along the sides of said opening; and

actuator means is connected with said center side clamps to cause them to engage and disengage said film independently of movement of said side clamps, said center side clamps
355 being operative to hold central side portions of the film as it is being gathered and after the front, rear and side clamps have released.

10. Apparatus as claimed in claim 1, wherein:

said film gathering, sealing and trimming means includes a pair of gathering bars positioned between the opening and an article partially enveloped in said film after the article has
360 been moved against the film and through the opening to stretch the film, said gathering bars being movable in forward and rearward directions toward and away from one another to gather the stretched film extending between the opening and the article into said generally flattened condition.

365 11. Apparatus as claimed in claim 10, wherein:

said film gathering, sealing and trimming means further includes film sealing and trimming means at opposite sides of said opening and movable toward and away from one another to gather said flattened film into said necked down condition.

12. Apparatus as claimed in claim 11, wherein:
370 said film sealing and trimming means comprises a U-channel member at one side of said opening, and a pair of normally spaced apart movable pinch fingers at the other side of said opening, said U-channel member being operative to push the film flattened by the gathering bars into the space between the pinch fingers as the U-channel member and pinch fingers move toward one another, whereby the flattened film is further gathered into
375 said necked down condition.

13. Apparatus as claimed in claim 12, wherein:
said gathering bars each comprise a pair of bars arranged one above the other and spaced apart a distance sufficient to extend above and below the U-channel member and the pinch fingers as they move toward one another.

14. Apparatus as claimed in claim 13, wherein:
the pinch fingers are movable toward one another to grip the film after it has been gathered into said necked down condition; and
sealing means is movable into engagement with the necked down film to fuse it and form a seal while the film is being held by the pinch fingers, thereby producing a shrink-
385 wrapped article.

15. Apparatus as claimed in claim 14, wherein:
the pinch fingers comprise an upper set of pinch fingers and a lower set of pinch fingers spaced from the upper set, said sealing means being engageable with the necked down film in the area between the upper and lower sets of pinch fingers to form said seal,
390 and said upper set of pinch fingers is pivotable as a unit from a first position aligned with the U-channel member to a second position angularly disposed with respect to the U-channel member, said movement of said upper set of pinch fingers from their first position to their second position serving to separate excess film from the sealed area, and said lower set of pinch fingers being operative to support the wrapped article; and
395 said pinch fingers in said upper and lower sets being movable away from one another, with the pinch fingers in said upper set being movable away from one another to

release the excess film gripped therebetween when the pinch fingers are in their second position, and the pinch fingers in the lower set are movable away from one another while in their original position to release the wrapped article to fall onto a take-away conveyor.

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16. Apparatus for automated stretch wrapping of an article in a stretchable transparent film, comprising:

means for advancing and holding a section of thin, stretchable, transparent film over an opening at a wrapping station;

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means for pushing an article to be wrapped against the film and through the opening to stretch the film and form a bag-like enclosure at least partially enveloping the article; and

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film gathering, sealing and trimming means adjacent the opening for gathering excess film material extending between the opening and the article, said film gathering, sealing and trimming means operative to gather the film in two stages to fully envelope the article, including a first stage in which the film is gathered into a generally flattened condition, and a second stage in which the film is further gathered into a necked down condition, and said sealing and trimming means is operative to engage the necked down film to seal it and separate the excess film from the stretch-wrapped article.

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17. Apparatus for automated stretch wrapping of a head of lettuce in a stretchable transparent film, comprising:

film advancing means for advancing a section of thin, stretchable, transparent film to a wrapping station;

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clamping means for holding the film at the wrapping station;

means for stretching and wrapping the film around the head of lettuce at the wrapping station;

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said film advancing means including mechanized film grippers which grip a leading edge of the film and pull it to the wrapping station and which release the film and return to a start position for again gripping the film to advance another section of film to the wrapping station after a previous section of film has been used to wrap a head of lettuce;

means for gathering excess stretched film around the head of lettuce to completely enclose the head of lettuce in the film; and

430 automated film sealing and severing means to seal the gathered film and separate the excess film from the wrapped head of lettuce.

18. Apparatus as claimed in claim 17, wherein:

film perforating means is operative to form small holes in the film after it is stretched but before it is gathered, to facilitate vacuum cooling of the lettuce.

435 19. Apparatus as claimed in claim 17, wherein:

the film comprises a polyethylene based multi-layer composition with an outer polypropylene layer for added gloss, slip and clarity, and has a 300% stretch capability, is approved for direct food contact, and has an anti-fog additive for moisture dissipation during temperature fluctuations.

440 20. A process for the automated stretch wrapping of heads of lettuce in a thin, transparent, stretchable film to produce wrapped heads of lettuce having the appearance of having been shrink wrapped, comprising the steps of:

providing a supply of the stretchable film;

advancing a section of the film over an opening at a wrapping station;

445 placing a head of lettuce on the section of film and stretching the film through the opening until the head of lettuce is spaced below the opening to at least partially enclose the head of lettuce;

gathering the stretched film extending between the opening and the head of lettuce by first gathering the film in a first direction to produce a generally flattened section of

450 film having substantial width, and then gathering the flattened section of film in a second direction to produce a narrow necked down section of film; and

heat sealing the necked down section of film and separating excess film from the wrapped head of lettuce.

455 21. A process of stretch wrapping a head of lettuce in a thin, stretchable, transparent film, comprising the steps of:

providing a strip of a polyethylene based multi-layer film with an outer polypropylene layer for added gloss, slip and clarity, wherein the film has a 300% stretch capability, is approved for direct food contact, has an anti-fog additive for moisture

dissipation during temperature fluctuations, is about thirteen microns thick, and has a
460 width of about sixteen inches;
stretching the film around the head of lettuce to enclose the lettuce;
gathering excess film into a necked down condition;
sealing the necked down section immediately adjacent the lettuce while
maintaining tension on the film; and
465 separating excess film from the sealed section to produce a stretch wrapped head of
lettuce having the appearance of having been shrink wrapped.

22. Apparatus for automated stretch wrapping of fresh heads of lettuce at the
point of harvest of the lettuce, comprising:
means for mounting the apparatus on an existing lettuce harvesting machine
470 adapted to be moved through a field of lettuce to harvest and bag the lettuce;
means for supporting on the apparatus a supply of stretchable transparent film;
film advancing means for moving a strip of the film from the supply to a film
wrapping station on the apparatus;
clamping means for holding a section of the strip of film in place over an opening
475 at the wrapping station;
means for placing a head of freshly harvested lettuce in the center of the section of
film;
means for stretching the section of film held over the opening and moving the head
of lettuce through the opening to a position spaced below the opening;
480 film gathering means for gathering the film stretched between the opening and the
head of lettuce; and
film sealing and trimming means for sealing the film adjacent the head of lettuce
and trimming excess film from the sealed head of lettuce.

23. A process for automated stretch wrapping of freshly harvested heads of
485 lettuce at the point of harvest, comprising the steps of:
mounting on an existing lettuce harvesting machine an apparatus for automated
wrapping of the heads of lettuce;

supporting on the apparatus a supply of thin, stretchable, transparent film approved
for direct food contact and having a 300% stretch capability, a thickness of about thirteen
490 microns, a width of about sixteen inches, and an anti-fogging additive;

stretching the film around the head of lettuce to tightly envelope the lettuce, and
gathering excess film into a necked down condition;

sealing the necked down section of film immediately adjacent the lettuce while
maintaining tension on the film; and

495 separating excess film from the sealed section to produce a stretch wrapped head of
lettuce having the appearance of having been shrink wrapped.